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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project | Date | Author

TITLE

THE BASS LAKE INSECT STUDY AREA

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by
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Berkeley, California
November 6, 1940

U.S. GOVERNMENT PRINTING OFFICE 8—9742

SUBJECT—

INDEX NO.—

Forest Insect Laboratory
Berkeley, California
November 6, 1940

THE BASS LAKE INSECT STUDY AREA

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THE BASS LAKE INSECT STUDY AREA

REASONS FOR ESTABLISHING THE AREA

The Bass Lake area is one of several areas to be established in different climatic zones of the west side pine type for a long time study of insect hazard in relation to climatic and other environmental factors. On this area it will be possible to follow the loss trends through a period of years with a considerable degree of accuracy. This area, among others to be studied from the Miami field laboratory, is typical of the marginal ponderosa pine type found at the lower elevational range of this tree. As a study unit to investigate the annual trends of bark beetle attacks, and the reasons for them, the Bass Lake area offers much promise because of the wide variety of exposures, slopes, sites and physiographical features. The low site quality of the areas northeast of the lake, for example, is set off by contrast to the much improved sites along the north and east slopes, southwest of the lake.

Additional features of primary consideration in the selection of the Bass Lake area are: (1) a direct tie-in with the weather records obtained by the California Forest and Range Experiment Station; (2) easy accessibility from the Miami laboratory by a modern high speed highway with a total distance of less than 12 miles; (3) a tie-in with insect loss records dating back to 1931 and the effect of control work carried on since 1933, during a time (1929-1933) when one of the worst western pine beetle epidemics known for this locality occurred.

While insect control work is essential to the protection of this timbered area, it is nevertheless somewhat of a disturbing factor to the correct interpretation of data. This factor, however, must be considered in the selection of any area within the Central Sierra timber belt, because of the periodic necessity for insect control.

The intensive use to which the Bass Lake area is subjected is also a factor which must be considered. Small saw-mills, wood and recreation are uses to which the Bass Lake pine type is continuously subjected. While these uses may influence to a certain degree the activity of destructive insects, such destruction, however, small, must be reckoned with in a long time study.

DESCRIPTION OF THE AREA

The Bass Lake area occupies approximately 8,000 timbered acres on the Sierra National Forest in township 7 south, range 22 east. Bass Lake is situated in the center of this area which forms a natural basin with drainage to the south. The lake which is $4\frac{1}{2}$ miles long by $\frac{1}{2}$ mile

wide and formed by a dam near the south end of the basin, occupies approximately 1300 acres. It lies in a northwest - southeast direction, and has approximately 12 miles of shore line. With the exception of an abrupt rise of the land area east of the lake toward the south end, all other areas rise gradually from the lake shore. The elevation of the lake is approximately 3,400 feet. The boundary of the area extends up to 4,500 feet on the north and east, and to a break in type along Taylor Mountain and Goat Mountain to the west of the lake.

The timber type is predominately ponderosa pine, varying from III to V site quality, west side type. The poorer sites are found on the south slopes, rising to the east of the lake, particularly toward the north end where the land area is characterized by many granite outcroppings. The north slopes rising to the west of the lake are better site quality, particularly the slopes of Goat Mountain. The timber adjacent to the shore line, and extending for an approximate distance of 150 to 300 yards inland, is nearly all second growth ponderosa pine from pole size to trees 24 inches in diameter. Elsewhere in the unit more typically virgin type stands predominate. Incense cedar is common throughout the entire unit. Sugar pine is prevalent along the north slopes of Goat Mountain and is less common in other areas of the unit. Digger pine is common on the south slopes. Black oak, live oak, manzanita and poison oak are the most prevalent understory species.

From the recreation point of view the timber values of the Bass Lake unit are inestimable. With the exception of between 3 and 5 miles of shore line on the east side of the lake near the south end, all other areas adjacent to the lake shore are occupied by public camp grounds, picnic grounds, play grounds, resorts and summer home lots. Between 3,000 and 5,000 persons from the San Joaquin Valley in and around Fresno populate the area during the summer. The popularity of this area is constantly on the increase, and is undoubtedly maintained and stimulated by the appreciation of its timber.

INSECT HAZARD

For the past 12 years, particularly during the period from 1929 to 1933, insects have killed and injured thousands of trees growing on the Bass Lake unit. The insects primarily responsible are the western pine beetle, Dendroctonus brevicomis; the top-killing pine engraver beetle, Ips confusus; and the California flathead borer, Melanophila californica. The combined action of these 3 species of insects, especially the action of the western pine beetle, caused death varying between 10 and 35 percent of the stand during an epidemic lasting for the first 5 years of this period with a peak in 1931.

The areas which suffered greatest loss were sites IV and V quality, located mostly on the south exposures east of the lake, particularly toward the north end. An example of the loss during the period

from 1931 to 1933 is indicated by figures taken from a 100 percent traverse strip cruise made in 1933* which showed that between 18 and 57 percent of the total number of trees and between 22 and 33 percent of the total volume on 3 sections was killed. On the north and east slopes opposite the west side of the lake, mostly site III, losses during that period were estimated on the basis of a traverse strip and a 320-acre plot survey to run close to 10 percent of the total stand.

Taken as a whole, the Bass Lake area including all sites, suffered an estimated loss for the 5-year period ending in 1933 of between 10 and 16 thousand trees having a volume between 6 and 8 million board feet. Since then the number of dead trees estimated on the basis of maintenance control work done each year from 1934 to 1939 amounted to between 700 and 1,000 trees having a volume between 250 and 400 thousand board feet.

The protection of these trees against insect attack each year takes on greater significance. Since 1933 the Bass Lake unit has been kept under constant surveillance by the Forest Service, under whose direction CCC insect control crews have maintained control and kept the area free from recurring bark beetle epidemics. Too much cannot be said of the importance of this program, considering the depredations of 10 years ago.

THE 1940 SURVEY

The purposes of the 1940 survey, in addition to finding out basic information on the extent and trend of infestations, were to set forth and define the boundaries of the study area and to establish strip and reconnaissance survey locations for adequate annual coverage. The survey was completed during the first week in September by Miller, Struble and Street. A map of the area as revised by this survey is attached to this report.

Details of the survey of insect damage included the establishment and 100 percent cruise of two 10-chain width strips, the establishment of three 10-chain width road strips for annual counts and estimates of loss, and reconnaissance counts from 3 view points, allowing complete coverage of the area. The details of each type of coverage are taken up separately.

Cruise Strips

Two strips 10 chains wide were set up. Strip #1 is located on the slopes east of the lake in sites IV and V quality, where losses in the past ran heaviest. Strip #2 is located on the slopes west of the lake, representing the best site III quality where losses ran lightest. The locations of these strips are as follows:

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* Reduction of Ponderosa Pine Stands on Bass Lake Area by Western Pine Beetle Epidemic, 1931-1933. G. R. Struble, March 5, 1934.

Strip #1 starts from the east shore of Bass Lake at a point where the section line between sections 9 and 16 hits the shore. From this point it follows along the section line between sections 9 and 16, 10 and 15, to the section corner between sections 10, 11, 14 and 15. A total number of 115 acres is included in this strip.

Strip #2 starts from the ¼-corner between sections 22 and 23 and runs west for a distance of 40 chains and contains 40 acres. The precipitation and erosion study station of the California Forest and Range Experiment Station is located near the starting point of this strip.

No 1940 losses were found on either of these two established strips.

Road Strips

Three road strips, 10 chains wide and covering 1,328 acres of the Bass Lake unit, were run by spotting infested trees from a moving vehicle. Mileage was kept by speedometer readings. The details on each strip are as follows:

Strip #1 starts at the junction of the roads north of the Emery Wishon airport and extends around the east side of the lake to The Pines. From there, it extends out the Beasore road for a total distance of 5.9 miles. It covers 472 acres.

Strip #2 extends from the same starting point as strip #1, but continues along the west side of the lake to the dam at the south end for a total distance of 5.5 miles. It covers 440 acres.

Strip #3 starts from The Forks, near the Bass Lake guard station, and extends around the west side of Goat Mountain to the Goat Mountain fire lookout, for a total distance of 5.2 miles. It covers 416 acres.

The following 1940 losses are recorded from these strips:

Strip Number	No. Trees Killed	No. Trees Top-killed	No. Trees Treated
1	0	0	6*
2	2	0	7*
3	0	0	0

* A number of faded trees near the lake shore were felled and peeled during the summer before the survey. Most of these died as a result of high water, but some contained flathead borers and the western pine beetle.

Reconnaissance Counts

Counts of top-killed and dead trees from 3 view points include those killed during the winter (1939-1940) and summer (1940). The view points are located on the map. Point #1, located on an open ridge ½ mile north of The Pines, views the north and west slopes from Goat Mountain to Taylor Mountain northwest of Bass Lake, and the areas in the immediate vicinity of The Pines. Point #2, located on Taylor Ridge, views the south and west slopes north of Bass Lake along Willow Creek. Point #3, located on the Goat Mountain fire lookout, views the slopes lying to the east of Bass Lake from The Pines southward, and the areas from the dam to the top of Goat Mountain.

For convenience in designation, 3 areas are set forth as separate study units of the Bass Lake area. Unit #1 includes the area from Taylor Mountain to the north fork of Chilkoot Creek. Unit #2 includes the slopes east of Bass Lake to the dam. Unit #3 includes the areas lying west of Bass Lake along Goat Mountain ridge. Counts by these unit designations are as follows:

Unit #	Number trees killed	Number trees top-killed
1	3	1
2	15	20
3	16	1

In evaluating the significance of the current infestation, it is seen that the greatest concentration of activity occurred along the slopes east of Bass Lake, considering the top-killed trees as well as those entirely killed. Parts of this area (Unit Two) were heaviest hit in the 1929 to 1933 epidemic, but on Unit One lying north of the lake, the current loss is insignificant even though it was here that the greatest losses occurred during the epidemic. The next heaviest loss occurred along the ridge top and the slopes of Goat Mountain where actual losses during the epidemic were lowest. Part of the explanation for these apparent discrepancies lies in the fact that far fewer trees are now left in Unit One than during the epidemic, and part of it is due to the scattered character of an endemic infestation.

PRESENT STATUS, RECOMMENDATIONS AND PLANS

The condition of the Bass Lake area as determined by the 1940 insect survey, indicates continued normal to low endemic status, with a slight rise over the previous year. Topkills were more in evidence than for the past several years, particularly along the slopes east of the lake. These top-kills, however, were more in evidence during the spring than later on in the summer (1940) indicating a slackening in activity. Western pine beetle activity caused a loss varying between 3 and 5 trees per section over the area taken as a whole. Concentrated centers of activity occurred in the vicinity of The Pines and along the crest of Goat Mountain. Both centers should be watched for further activity.

Annual surveys of the areas set up in this report will be continued indefinitely. Detailed studies of the interrelationship between the insects, trees, and environmental influences are planned for future consideration.

Photo 1 (7455). East slopes of Goat Mountain directly west of Bass Lake. The timber type here is predominately Site III quality. When this photograph was taken (1931) the insect loss ran close to 10 percent of the stand. Note groups of faded trees.

Photo by K. A. Salman.

Photo 2 (8490b). Site III quality timber along the north slope of Goat Mountain, due south of The Forks at Bass Lake. This photograph was taken in 1931 and shows scattered faded trees killed by insects during that year. The loss here was light compared to other areas in the Bass Lake unit. The trees lining the lake shore are nearly all second growth ponderosa pine.

Photo by J. M. Miller.

Photo 3 (8555). Timbered areas lying immediately north of Bass Lake are predominately site IV and V quality. As shown by this photograph the area is largely broken up by granite outcroppings, open ground, brush fields, etc. Digger pines are common here. Note the heavy kill, left center, caused by Ips confusus in 1931. Photo by J. M. Miller.

Photo 4 (8484). West slopes lying east of Bass Lake toward the north end. The site IV and V quality of the timber here is very similar to photo 3. The 1929-1933 epidemic of the western pine beetle caused losses along this ridge varying between 25 and 50 percent of the stand. This photograph, taken in the spring of 1932, shows many faded trees scattered over the entire area. Photo by J. M. Miller.

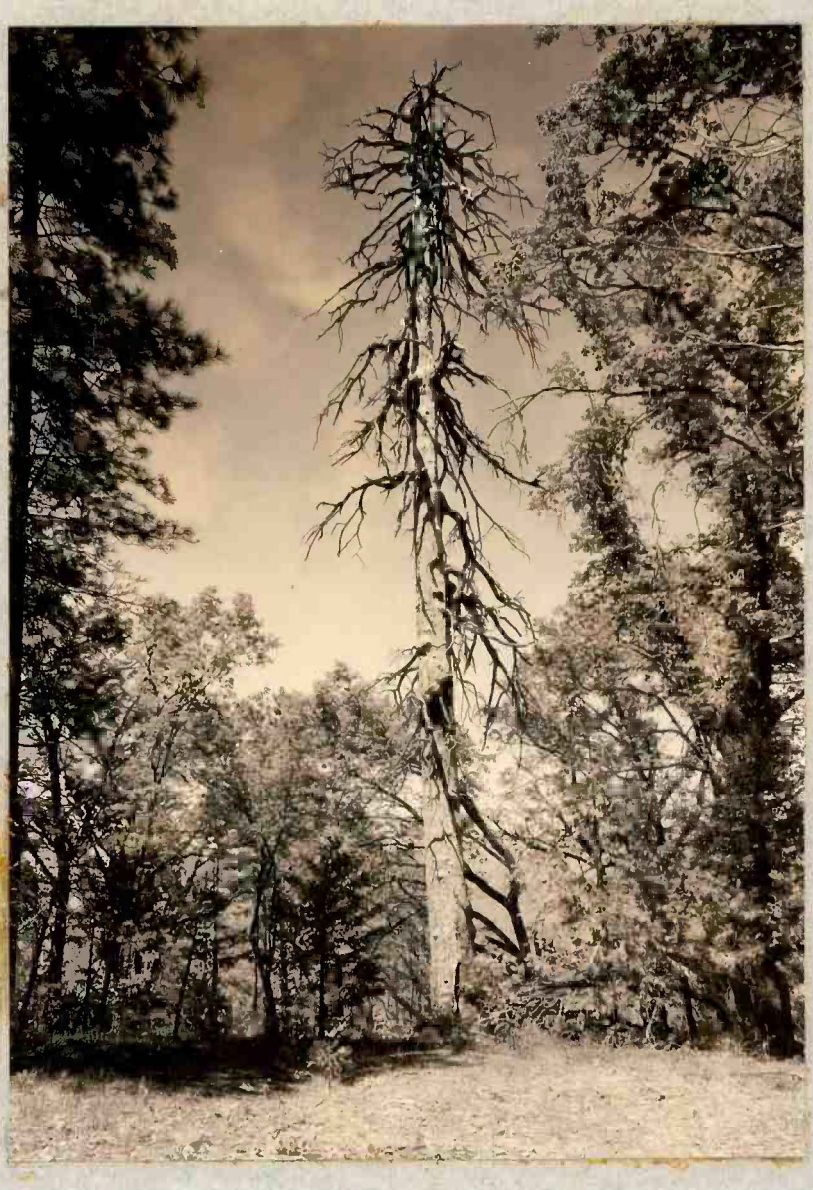

Photo 5 (10014). Five years after the peak of the western pine beetle epidemic at Bass Lake, this bleached ponderosa pine snag stood on the ridge near Goat Mountain as a reminder of the past. Photo by J. E. Patterson.

Photo 6 (8681). Open, mixed type stand of timber found northeast of Bass Lake near the edge of the Bass Lake unit.

Photo by J. E. Patterson.

INSECT CONTROL UNIT

Losses 1931 - 1933

- Less than 10% of stand (vol.) killed
- 15-25% of stand (vol.) killed
- 35% of stand (vol.) killed
- Survey Strips

McLeod Flat

To Yosemite

Taylor Mtn

North Fk Chiquito Cr.

THE FALLS

Strip No 1

37° 20'

THE PINES

Bass Lake

Crane Valley

BASS LAKE G S

SPENHOFF

Strip No. 2

WISHON

Graham Mdws.

Goat Mtn

Malum Ridge

PH

5 4 3 2 8 9 10 11 17 16 13 21 22 23 24 27 26 25 35 36

N

Scale

1 mile

80 chains

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PLANT and QUARANTINE
BASS LAKE, SIERRA N. F.
T 7 S, R 21 E, MDM
Scale: 1" = 40 chs E. G. List, Jr.
9-40

BASS LAKE STUDY AREA - 1940

VIEW POINTS

DEAD TREES

TOP KILLED TREES

To Yosemite

Taylor Mtn

Hotel Flat

North Fk Chilkoot Cr

UNIT ONE

UNIT TWO

UNIT THREE

Strip Road #1

Strip Road #2

Strip Road #3

Crane Road

THE FALLS

Strip No. 1

THE PINES

Bass Lake

BASS LAKE G.S.

SPENHOFF

Strip No. 2

WISHON

Graham Mdws.

Goat Mtn

Malum Ridge

37° 20'

5 4 3 2 1 6 7 8 9 10 11 12 17 16 15 14 13 18 21 22 23 24 27 26 25 30 29 28 31 32 33 34 35 36 3

N

Scale

1/8 1/4 1/2 1 miles

0 0 20 40 80 chains

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BASS LAKE, SIERRA N. F.
T 7 S, R 22 E, M.D.M.
Scale: 1" = 40 chs. E. G. List, Jr.
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